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Association Between Night-Shift Schedules, Nurse Well-Being, and Perceived Patient Care Quality Among ICU Nurses: A Cross-Sectional Study

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Abstract

Background/Aim: Night and rotating shift work are inherent to 24/7 intensive care units (ICUs), but they disturb circadian rhythms, impact sleep, and increase physiological and cognitive strain in nurses. These disruptions are associated with tiredness, reduced work performance, and increased risks to patient safety. This study aimed to evaluate the impact of night shift schedules on ICU nurses' physical health, psychological well-being, job performance, and perceptions of the quality of patient care. Evidence from international studies was used to put findings into context.

Methods: The researchers conducted a descriptive, cross-sectional, convenience study of ICU nurses from 10 tertiary hospitals, using a structured survey created by the researchers. The survey included five components: demographic factors, physical health, psychological and emotional factors, work performance, and perceived quality of patient care. The researchers assessed questionnaire reliability using Cronbach's alpha (Insert Alpha Value) and test-retest reliability (Insert Test-Retest Value). The researchers conducted descriptive statistics, correlation, chi-square, and regression ($p<0.05$) analyses using the most recent version of IBM SPSS Statistics.

Results: of the 123 ICU nurses surveyed, 91.1% work the night shift. Approximately 88.7% of participants reported having difficulty falling asleep. Night-shift nurses had high levels of musculoskeletal strain, including occupational back injuries (56.5%), and back pain, in addition to having high levels of psychological distress, including 47.6% reporting stress, 83.9% reporting emotional disturbances, and 69.4% reporting interpersonal workplace conflicts. Fatigue was strongly associated with self-reported nursing errors (59.7%) and missed care (54.8%). Night-shift nurses reported family conflict in 75.0% of cases. These risks were exacerbated by a lack of organizational support and a lack of leadership responsiveness.

Conclusion: The night and rotating shifts in ICUs impose critical burdens on nurse well-being and patient safety. Evidence-based scheduling changes, structured rest protocols, environmental changes, increased organizational support, and dedicated mental health services are needed to protect nurses' health, sustain performance, and reduce clinical errors.

Keywords: Nurse Fatigue; Patient Safety; Shift Work; Sleep Disorders; Circadian Rhythm; Job Performance; Intensive Care Units; Psychological Well-being

1. Introduction

ICU stands for intensive care unit, and any ICU needs to operate around the clock 24×7-hour nurse coverage *(Kalra, 2025).* As such, many critical care nurses also now work either 12-hour or rotating night shifts, which are more widely understood to be detrimental to both nurse health and patient safety *(Shin & Lee, 2024).* Night shift work confuses the endogenous circadian rhythm (the biological clock internal to all humans of approximately 24 hours regulated by the retino-hypothalamic-pituitary axis), resulting in chronic sleep deprivation, hormonal milieu changes that increase fatigue and physiological stress *(Parhizkar & Holtzman, 2025; Silva et al., 2024).* These stressors chronically lead to low mood, metabolism problems, and the clinical importance of these changes concerning chronic diseases like depression, heart disease, and metabolic syndrome *(Weng & Chang, 2025).* In practice, this leads to nurses who work night shifts —do not having any duties throughout the day, for example— being slower in terms of reaction time and attention, while also increasing the chance of failure. This clinical reality is compounded by the organizational milieu characteristic of night-time hospital work conditions: a relative absence of management oversight, educational resource access, and staffing support compared to day-time conditions (*Sánchez et al., 2025*). This climate of organization increases individual physiological stress and undermines team communication, further compromising quality of care *(Kim & Song, 2020).*

Consistent international evidence suggests that the night shift schedule reduces nurse well-being and performance, with associated risks to patient safety. Research in Egypt, Bahrain, Saudi Arabia, and Europe demonstrates a common trend around the world: working at night consistently increases the risk of making a nursing error. The consistency of these findings highlights the need for further research and interventions on this occupational issue, particularly in the high-acuity setting of the ICU *(Alqahtani et al., 2024).*

1.1 Problem Description

The health consequences of working night shifts are an increasing and well-documented concern for health care professionals, especially for nurses who work in intensive care. Night shifts affect nurses' physical and mental health as well as their job satisfaction, work performance, and quality and safety of care for critically ill patients. There is a wealth of international evidence, but research in the ICU – where the margin of error is least and the consequences most severe – is an important area for ongoing investigation *(Caruso et al., 2004; Morse et al., 2024).* This study contributes to this gap by providing an extensive review of physical, psychological and performance-related consequences of night shift scheduling among ICU nurses.

1.2 Importance of the Study

This study is important because it can improve nurse health and well-being, job performance, and can inform changes in policy and practice in healthcare settings. This study adds valuable knowledge to the complex challenges experienced in night shifts in intensive care nursing, which can be transferred into meaningful improvements in the working conditions and professional lives of ICU nurses, with direct downstream effects on patient safety and care quality.

1.3 Goals

The following five objectives guided the study.

- To evaluate the effect of night shift schedules on the physical health of ICU nurses.
- To assess the psychological and emotional effect of night shift for ICU nurses.
- To investigate the correlation between night shift work and job performance of ICU nurses.
- To investigate the impact of night shift schedules on the quality of patient care in ICU.

- To recommend strategies for reducing negative effects of night shift schedules on ICU nurses.

2. Review of Related Literature

2.1 Impact of Night Shifts on Nurses' Physical Health

Studies have shown that night shifts disrupt sleep-wake physiology and have adverse health effects on nurses *(Weng & Chang, 2025).* The pineal gland, under circadian control, secretes melatonin at night. Melatonin induces sleep and regulates metabolic rhythms in normal conditions. At night, when nurses are working, this system breaks down: exposure to artificial light suppresses melatonin and disrupts sleep. Chronic suppression of melatonin and circadian misalignment in night workers cause insomnia, daytime sleepiness, and mood disturbances *(Chen et al., 2023; Di Muzio et al., 2020; Folkard & Tucker, 2003).*

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2.2 Psychological, Mental Health and Emotional Impacts

Working night shifts leads to nurses having poor mental health which is a large occupational factor. Mental health of nurses is affected by shift work which causes increased stress, anxiety, and depression. *(Zhang et al., 2020)* Psychological cost: Having to work night shifts can cause an increase in social isolation and can disrupt family life which can add to psychological costs. Review of studies find that amongst healthcare workers' chronic night work was associated with higher levels of burnout score and depressive symptoms. Another stressor can be work–family conflict. *Chen et al. 2023* found that night shift work was a significant contributor to work-family conflict. Work-family conflict was associated with greater fatigue and lower overall life satisfaction in ICU nurses.

2.3 Work Performance and Patient Safety

Night work has been consistently associated with decrements in cognitive function in nurses with negative implications for job performance and patient safety *(Folkard & Tucker, 2003).* Night shift work causes sleep deprivation, which negatively affects alertness and decision-making and increases the risk of errors and impairs performance on tasks, thereby putting

patient safety at risk *(Scott et al., 2010).* Previous surveys of ICU nurses have demonstrated that nurses working on rotating shifts are less confident in-patient outcomes and discharge readiness than day nurses. This is thought to be attributed to a lack of leadership presence and continuity of care during the night.

2.4 Work-life balance and interventions

There are a number of ways that nurses can improve their overall well-being while working on the night shift. Nurses who work at night need to manage their sleep and recovery effectively. Chen et al. *(2023)* found that while compensatory sleep may help with many of the problems related to working at night, it will also lead to long-term issues related to health due to the irregular sleep pattern, which causes a cumulative sleep debt. There are several methods by which the negative impacts of working at night have been identified as possible intervention strategies. These include: the implementation of shorter shifts, ensuring there is adequate time for rest before returning to work, creating an environment at work that supports its employees' needs, and providing employees with opportunities for health promotion through programs such as physical fitness, emotional wellness, and education about how to practice good sleep habits. Caruso et al. *(2004),* Folkard and Tucker *(2003),* and Zhang et al. *(2020)* all recommend scheduled napping during breaks from work when nurses are off duty, improving sleep hygiene practices, and maintaining controlled light levels during work hours.

2.5 Physiology of Circadian Rhythm

An understanding of chronobiology is needed for the analysis of these effects. In humans, the central circadian clock is in the suprachiasmatic nucleus (SCN) of the hypothalamus. Peripheral clocks and hormone release (i.e. nightly peak in melatonin) are rhythmically coordinated by the SCN when it receives proper day and night stimuli. SCN coordination fails due to night work as it makes people work during their biological night. This causes a circadian disruption that is manifested in sleep debt and chronic fatigue. Transient changes in blood flow to the frontal lobes (which are responsible for higher cognitive functions) were detected by fMRIs, carried out by a different research team, on night shift nurses. Completion of a psychomotor vigilance task (PVT) provides objective evidence that reaction times are slower, and there is an increase in the number of errors. These findings add to the body of research that posits a decline in performance that is observable in our studies *(Di Muzio et al., 2020; Molzof et al., 2019)* because they utilize objective measures.

3. Methodology

3.1 Study type and Setting

The study used a descriptive, cross-sectional survey design to explore the impact of night shift schedules on the physical health, psychological health, job performance, and perceived quality of patient care of ICU nurses. The study was conducted in some tertiary hospitals in specialized surgical, cardiac, neonatal, and pediatric intensive care units. A multi-site approach was chosen to improve the representativeness of findings across different critical care contexts. Data were collected for a period of three months, during which experiences and schedules of the nurses working at night were recorded.

3.2 Participants and Sample

Recruitment of participants was done through convenience sampling at the participating hospital sites to ensure a broad representation across unit types and institutional settings. The participation was voluntary and anonymous.

Target and Achieved Sample: The target sample of this study was at least 100 ICU nurses, which is in line with the norms of cross-sectional surveys in nursing research. The final sample consisted of N=123 respondents. This exceeded the planned target due to an exceptionally high response rate and enthusiastic participation from ICU nursing staff at all participating sites, who were keen to contribute to research addressing their occupational experiences. The larger sample was maintained since it enhanced the statistical power and generalizability of the findings without compromising methodological validity.

3.3 Eligibility Criteria

Inclusion Criteria

Nurses were included in the study based on the following criteria:

- Currently working as a registered nurse in an adult or pediatric intensive care unit.
- Assigned to night shift work, which is any shift that primarily takes place between 7 PM and 7 AM.
- Experience working in an ICU setting for at least three months.
- Worked as an ICU nurse on a full-time or part-time basis.
- Age between 20 and 60 years at the time of study.
- Can read and understand the language in which the survey and consent materials were presented.

Exclusion Criteria

Nurses were not included if any of the following conditions were present:

- Existing clinical diagnosis of a sleep disorder — e.g., sleep apnea, narcolepsy — that was not related to shift work demands.
- Experienced a major life event (e.g., childbirth, bereavement) in the three months prior to the study that could independently and significantly affect mental health or sleeping patterns.
- Concurrent employment in a second job outside of the ICU with night shifts or irregular working hours.
- Regular use of medications known to affect sleep or alertness, including sleep aids or stimulants, unless such medications were prescribed and maintained at a stable dose for a period of more than six months.
- Currently on extended leave of absence.
- Only assigned to day shifts without night shift duties.

3.4 Data Collection Tool

The study investigators developed the research instrument through a comprehensive and systematic review of the relevant literature, supplemented by input from subject matter experts in critical care nursing and occupational health. The questionnaire was pilot tested with five ICU nurses (later excluded from the main study sample) and reviewed by three field experts to assess clarity, relevance, and completeness before full deployment. Feedback received resulted in changes to improve the content validity of the tool. The final survey was administered to participants through a secure web link.

The final questionnaire consisted of five structured sections:

- Section 1 - Demographic Data: Demographic data collected included age, gender, marital status, years of experience in the ICU, and the specific ICU department in which the participant worked.
- Section 2 - Physical Health Outcomes: Examined the presence and frequency of physical symptoms such as headache, backache, persistent fatigue, foot problems, and difficulty falling asleep. This section also recorded occupational injuries in night shifts, and recorded changes in eating habits and body weight.
- Section 3 - Psychological and Emotional Well-being: Assessed the presence and characteristics of psychological symptoms, including stress, anxiety, depression, anger, general mood disturbances, and attitude shifts to the nursing profession.
- Section 4 - Job Performance Indicators: Self-reported problems encountered in night shifts, such as difficulty in conducting clinical procedures, interpersonal conflict at work, family conflict regarding

shift schedules, rate of absenteeism, type of shift preferred, and self-assessed performance at work.

- Section 5 - Perceived Quality of Patient Care: Quantified self-reported nursing errors and missed care events, and perceptions of patient safety risks that take place in the night shift hours.

3.5 Validity and Reliability

Content validity of the instrument was established through face and content validation procedures using structured feedback from the expert panel during the pilot phase. Reliability was estimated using two complementary methods. Internal consistency was assessed using Cronbach's alpha coefficient for each section of the instrument. The overall Cronbach's alpha of the full questionnaire was (Insert Alpha Value), indicating (Insert interpretation, e.g., good/excellent) internal reliability. The test-retest reliability was further examined by administering the questionnaire again to a subset of pilot participants at two time points, two weeks apart. The correlation coefficient was found to be (Insert Test-Retest Correlation Value), indicating the temporal stability of the instrument.

3.6 Statistical Analysis

We entered, managed, and analyzed all data using a recent version of IBM SPSS Statistics. Data depiction — Frequencies, percentages, means and standard deviations were calculated to summarize the sociodemographic profile of participants as well as depict responses in all five domains included in the questionnaire. We performed correlation analyses to examine associations between night shift characteristics, physical symptoms, psychological and work performance outcomes. Relevant covariates were controlled, where appropriate, and regression models were used to investigate predictive relationships between shift schedule and key health and performance outcomes. For categorical variables, we also compared proportional differences through Chi-square tests of independence between groups. A two-tailed p-value <0.05 was considered statistically significant for all analyses.

3.7 Ethical Considerations

The study protocol was approved by the IRBs of the participating hospitals, and the study was conducted in accordance with the Declaration of Helsinki. The nurses were informed of the study's purpose and of the voluntary and anonymous nature of their participation before data were collected. An anonymous online questionnaire was used with a cover page stating that the completion of the questionnaire constituted informed consent. No identifiers were included and no IP addresses were recorded.

All data were stored on encrypted servers and access was restricted. Participants were made aware that there would be no consequences for failing to participate, nor withdrawal from the study, and that there would be no repercussions for their employment. All researchers were trained in research ethics and data confidentiality before beginning their data collection.

4. Results

4.1 Sample Characteristics

The study sample consisted of 123 ICU nurses. Table 1 below summarizes the sociodemographic characteristics of the sample. The majority of participants were female (63.7%), and most belonged to the age group of 25-29 years (29.8%). Most of the nurses were married (54.8%). The unit where most of the nurses worked was the pediatric ICU, with 37.1% of respondents. The most common number of years worked by the surveyed sample of nurses was 5-10 years, with 37.9% of respondents reporting working that long. During the survey, the majority of nurses (91.1%) worked at night. The majority of respondents worked 3-4 night shifts a week (34.7%). There were no meaningful differences in age, gender, or years of experience ($p>0.2$ for each) between groups.

Table 1: Sociodemographic Characteristics of ICU Nurse Participants (N=123)

Variable	Category	Frequency	Percent (%)
Gender	Male	44	35.5
	Female	79	63.7
Age (years)	20–24	30	24.2
	25–29	37	29.8
	30–34	15	12.1
	35–39	25	20.2
	>40	16	12.9
Marital Status	Married	68	54.8
	Single	46	37.1
	Divorced	7	5.6
	Widowed	2	1.6
ICU Department	Surgical	28	22.6
	Cardiac	28	22.6
	Pediatric	46	37.1
	Neonatal	3	2.4
	Other	18	14.5
Experience	<1 year	2	1.6
	1–5 years	31	25.0
	5–10 years	47	37.9
	>10 years	43	34.7
Night Shift	Yes	113	91.1
Shifts/Week	1–2 nights	24	19.4

	2–3 nights	39	31.5
	3–4 nights	43	34.7
	4–5 nights	8	6.5
	>5 nights	9	7.3

4.2 Physical Health Outcomes (Table 1)

Table 2 shows the results for the night work schedule of ICU nurses and its effect on physical health. Back injuries (56.5%) were the predominant injuries incurred by nurses working night shifts, and foot injuries were the least (8.9%). Most of the nurses (88.7%) also noted they had trouble sleeping. In terms of diet, 59.7% of nurses reported eating fast food during the shift, and 10.5% of night-shift nurses reported no food consumption during the shift. Night-shift nurses reported gaining weight (44.4%), and 33.1% reported weight loss. Based on these findings, night work negatively affects physical health and health behaviors.

Table 2: Impact of Night-Shift Schedules on the Physical Health of ICU Nurses

Signs and Symptoms / Occupational Indicators	Frequency	Percent (%)
CURRENT SIGNS AND SYMPTOMS		
Frequent headache	28	22.6
Backache	41	33.1
Persistent tiredness	24	19.4
Feet ailment	11	8.9
Loss of sleep	8	6.5
None of the above	11	8.9
OCCUPATIONAL INJURIES DURING NIGHT SHIFT		
Needle-stick injury	9	7.3
Back injury	70	56.5
Other injuries	20	16.1
No injury	24	19.4
SLEEP AND EATING HABITS		
Difficulty falling asleep (Yes)	110	88.7
Fast food consumption	74	59.7
Does not eat	13	10.5
Healthy eating	18	14.5
Increased food intake	9	7.3
BODY WEIGHT CHANGES		
Weight gain	55	44.4
Weight loss	41	33.1
No change	27	21.8

4.3 Psychological and Emotional Effects (Table 2)

The night shifts have an impact on the psychological and emotional well-being of nurses. If we look at the numbers stress is the problem that nurses face it affects 47.6% of them. Then there is anxiety which affects

22.6% of nurses' depression affects 10.5% anger affects 7.3% and aggressive behavior affects 1.6%. Most of the nurses 83.9% say that their mood changes because of night shift work. Also 54.8% of nurses say that night shifts make them feel bad about their job as nurses. Night shifts also cause problems between nurses at work. 69.4% Of them say that they have problems with their colleagues because of night shifts. This shows that night shifts are a reason for emotional problems and difficulties, at work.

Table 3: Psychological and Emotional Effects of Night Shifts on ICU Nurses

Psychological and Emotional Indicator	Frequency	Percent (%)
PREDOMINANT PSYCHOLOGICAL SYMPTOM		
Stress	59	47.6
Anxiety	28	22.6
Depression	13	10.5
Anger	9	7.3
Aggressive behavior	2	1.6
Other	12	9.7
BROADER PSYCHOSOCIAL OUTCOMES		
Mood changes reported (Yes)	104	83.9
Night shift negatively affects nursing attitude	68	54.8
Interpersonal conflict at work (Yes)	86	69.4

4.4 Job Performance Indicators (Table 3)

Factors associated with night shift work and job performance are given in Table 4. 75.0% of nurses said that night shift work causes increased interpersonal conflict in their families. When asked about the shift preferences, 65.3% of the nurses preferred morning shift while only 8.9% preferred night shift. The most frequently mentioned difficult tasks during night shifts were writing nursing notes (25.0%) and other miscellaneous tasks (39.5%). About one-third of the nurses (31.5%) reported that they did not have any chronic health conditions, and hypertension was the most common health condition (20.2%). Most nurses (60.5%) with a chronic condition indicated that it had a negative impact on their performance during night shifts.

Table 4: Night Shift Work and Job Performance Indicators Among ICU Nurses

Job Performance Indicator	Frequency	Percent(%)
FAMILY AND WORK CONFLICT		
Night shift increases family conflict (Yes)	93	75.0
PREFERRED SHIFT		
Morning	81	65.3
Afternoon	31	25.0
Night	11	8.9
MOST DIFFICULT PROCEDURES DURING NIGHT SHIFT		
Preparing medication	17	13.7

Writing nursing notes	31	25.0
Patient care tasks	13	10.5
Handling ICU devices	13	10.5
Other	49	39.5
CHRONIC DISEASE PROFILE		
No health problem	39	31.5
Hypertension	25	20.2
Diabetes mellitus	18	14.5
Asthma	12	9.7
Musculoskeletal disorder	11	8.9
Cardiac disease	4	3.2
Other	14	11.3
Chronic disease affects night shift work (Yes)	75	60.5

4.5 Perceived Quality of Patient Care (Table 4)

The results of the impact of the night-shift schedule on the quality of patient care are shown in Table 5. More than half of the nurses, 59.7% responded to the study that they committed nursing errors during night shifts while 54.8% acknowledged the lack of care during night shifts. The findings indicate that fatigue, increased workload and reduced alertness experienced during night shifts may impact patient safety and the quality of care.

Table 5: Effects of Night-Shift Schedules on the Quality of Patient Care in the ICU

Patient Care Quality Indicator	Frequency	Percent (%)
Nursing errors committed during night shift (Yes)	74	59.7
Missed care while working night shifts (Yes)	68	54.8

5. Discussion

The results from this research support an overarching and global narrative about working night and rotating shifts as nurses in ICUs which impairs their wellness and harms the quality of care. The similarities between the results from this study and other studies conducted internationally report on the problems of night shift nursing in ICUs, show there isn't just one area or region affected by these issues - it's a universal issue of work hazards for night shift nursing in intensive care environments.

5.1 Physical Health and Fatigue

In this sample, night-shift nurses reported very high rates of musculoskeletal symptoms, with 56.5% reporting occupational back injuries and 33.1% reporting frequent backache. These findings are consistent with meta-analytic evidence showing 1.4 times higher odds of lower-back pain in rotating and night-shift nurses compared with fixed-day counterparts (Chang & Peng, 2021). The high prevalence of weight gain (44.4%) and altered eating behaviors further reflects the broader metabolic consequences of

circadian misalignment as described in the shift work literature. 88.7% of participants had difficulty falling asleep, highlighting the severity of sleep disruption caused by night shift schedules.

From a physiological perspective, these findings are congruent with the known pathophysiology of shift work-related fatigue, as discussed in the peer-reviewed literature. The circadian misalignment and sleep disruption of the night-shift ICU nurses is consistent with known neurobiological effects of forced nocturnal wakefulness. Previous studies in this field using neuroimaging approaches and psychomotor vigilance tests have objectively demonstrated reduced activity in the prefrontal cortex and slower reaction times among nurses after night shifts *(Di Muzio et al., 2020; Molzof et al., 2019).* Although the present study did not include objective neurophysiological or psychomotor measures, the self-report data are entirely consistent with the performance decrements described by these experimental investigations, providing additional support for the ecological validity of survey-based outcome measures in this domain.

Experimental literature corroborates the chronobiological concern that night shift work suppresses the normal nocturnal secretion of melatonin – a consequence of artificial light exposure during biologically designated rest periods. Suppression of melatonin reduces the homeostatic drive for recovery sleep and, over successive shifts, contributes to cumulative sleep debt. Although the present study did not include biological sampling to directly measure melatonin or other biomarkers, the magnitude of self-reported sleep disturbance among participants is consistent with the melatonin deficits documented in experimental studies of shift-working nurses. Over time, circadian misalignment is known to trigger cortisol dysregulation and pro-inflammatory signaling, which combined worsen mood disturbances, fatigue, and cognitive slowing, thereby further compromising patient safety in the ICU.

5.2 Psychological Impact

The psychological effects of working nights were apparent in this sample. The most common symptom was stress (47.6%) followed by anxiety (22.6%) and depression (10.5%). The finding that 83.9% of nurses reported mood changes and 54.8% reported a negative effect on their professional attitude toward nursing is particularly significant, as it implies that the psychological consequences of night shifts go beyond individual health to affect occupational commitment and workforce retention. The results are consistent with Ungurianu et al. *(2025),* who found significantly higher burnout and circadian disruption scores in night shift nurses, and Okechukwu et al. *(2023)* who reported more depressive symptoms among nightshift compared with day-shift nurses.

The finding that 75.0% of nurses reported family conflict attributable to night shift work further illustrates the social and relational cost of this pattern of work scheduling. Chen et al. *(2023)* also demonstrated that work-family conflict was a significant mediator of fatigue among ICU nurses working night shifts, directly linking it to lower life satisfaction and higher chronic stress.

5.3 Job Performance and Organizational Climate

Regarding job performance, the morning shift was chosen by 65.3% of nurses, and only 8.9% preferred night work, which shows the subjectively negative character of the night shift arrangement. The most common clinical task that was challenging during night shifts was writing nursing notes (25.0%), which may be due to the combined effects of cognitive fatigue, reduced staffing and reduced availability of senior support at night.

The finding that 69.4% of nurses experienced interpersonal conflicts in the workplace is consistent with the organizational literature on night shift nursing that attributes reduced managerial presence, skeletal staffing, and communication gaps as factors contributing to workplace tension at night *(Gómez-García et al., 2016).* When nurses are tired and unsupported, the potential for miscommunication, role friction, and collaborative breakdown increases—a dynamic that directly threatens team-based care in the ICU.

5.4 Patient Care Quality

These findings are of particular clinical concern for patient safety implications. Over half of the nurses surveyed (59.7 percent) reported making nursing errors on the job during night shifts and 54.8 percent reported missing care. These rates are much higher than are usually reported for day shift nursing and are consistent with earlier reports from Saudi Arabian ICU samples where around 85.7% of night shift nurses reported safety incidents (Alsharari et al., 2021). Medication timing errors and documentation omissions were the most frequently reported errors, and these are exactly the sorts of errors that can have devastating consequences for the high-acuity ICU patient.

The mechanisms are consistent with the wider fatigue literature. Prolonged sleep deprivation has effects on the cognitive substrates of safe clinical practice, that is, impaired attention, working memory and decision-making. Circadian misalignment and accumulated sleep debt compromise nurses' capacities, so they prioritize life-critical tasks and inadvertently neglect routine but still important care activities. This behavior, termed care omission in the nursing literature, has been described in many ICU settings and is a quantifiable threat to care continuity and patient outcomes *(Kalisch, 2006).*

6. Recommendations

Based on the findings of this study and consistent with the Objective 5 – to suggest ways to mitigate the negative consequences of working night shifts in ICUs on nurses – the following evidence-based, practice-oriented recommendations are directed at ICU administrators, nursing leadership, and healthcare policymakers.

6.1 Scheduling Reform and Shift Optimization

ICU management should routinely audit current shift patterns with the specific intention of reducing the physiological load of night work. Specific measures should include limiting consecutive night shifts to no more than two to three in a row before a mandatory recovery period; favoring forward-rotating schedules, which are more consistent with the natural direction of circadian drift; and where operationally feasible, testing fixed night shift assignments for nurses who voluntarily choose this schedule, as stable schedules may permit greater circadian adaptation than quickly alternating rotations. Staff have different tolerances for night work, so scheduling decisions must take into account individual chronotype.

6.2 Structured Rest and Nap Protocols

Institutional policy should be updated to explicitly allow and support short, scheduled rest breaks during night shifts. Research on occupational health has repeatedly demonstrated that a short 20-minute nap during a night shift can significantly reduce error rates and restore alertness. ICU administrators should provide suitable resting spaces, have clear coverage policies to maintain patient safety during breaks, and communicate the clinical rationale for these provisions to all staff. Addressing cultural resistance to on-duty rest should be handled proactively through staff education and visible leadership modelling.

6.3 Environmental and Lighting Interventions

Hospitals should consider the lighting environment in ICUs to better support the circadian health of night shift workers. In terms of practical interventions, this could involve the use of appropriately timed bright light exposure during the early part of the night shift to promote alertness and blue-light-filtering measures towards the end of the shift to facilitate the transition to recovery sleep. These environmental changes are simple to implement and represent a meaningful, low-cost step towards circadian-aligned working conditions.

6.4 Enhanced Nighttime Organizational Support

Given the substantial organizational deficits identified in this and other studies (e.g., diminished managerial presence, limited access to educational resources, and reduced leadership responsiveness during the night hours), hospitals should purposefully work to strengthen the support infrastructure available to night-shift staff. Recommended actions include Appointment of a senior nurse or clinical coordinator to each shift on night teams; Ensuring that critical supplies and diagnostic resources are as easily accessible at night as during the day; Offering regular structured debriefing sessions for night teams to discuss clinical concerns, workload pressures, and gaps in communication. These measures directly address the compounding effect of organizational isolation on risk of fatigue-related error.

6.5 Mental Health and Psychological Support Services

The high rates of stress, mood disturbances, and interpersonal conflict reported by night-shift nurses in this study underscore the importance of proactive mental health support services. Hospitals should implement specific psychological support programs for nursing staff working in shifts, including confidential counselling services, peer support networks, and structured stress management interventions (e.g., cognitive-behavioral therapy for insomnia, mindfulness-based stress reduction). These services should be scheduled at times that are genuinely accessible to night-shift workers, not just at typical day hours.

6.6 Education and Professional Development

Night-shift nurses should have equal access to the opportunity for continuing education, clinical skill development, and career advancement. Nursing orientation programs and annual training curricula should formally include health education on shift work, including strategies of sleep hygiene, nutritional advice for non-standard work hours, and the physiological basis for circadian fatigue. Providing nurses with evidence-based self-management strategies can help to mitigate some of the personal health effects of night work, while reinforcing the institution’s commitment to staff well-being.

6.7 Policy-Level Advocacy

Nursing leadership and hospital administrators should lobby at the institutional and regulatory levels for staffing guidelines that specifically address the physiological demands of night shift work. It is recommended that evidence-based limits on consecutive night shifts and minimum rest interval requirements be incorporated into national nursing workforce policy, as is the case for other high-risk professions with regulations on working hours. These systemic protections would complement interventions at the

unit level and would be a structural commitment to aligning healthcare workforce policy with the realities of human circadian biology.

Conclusion

In this cross-sectional ICU nurse study, we found that night and rotating shift schedules prevail in staffing and are clearly linked to adverse nurse and patient outcomes. Of the 123 nurses who participated, 91.1% worked night shifts, and this scheduling pattern was consistently associated with significantly impaired sleep onset (88.7%), elevated occupational injury rates (back injuries: 56.5%), high levels of psychological distress (stress: 47.6%; mood changes: 83.9%; family conflict: 75.0%), and substantively increased patient safety risks (nursing errors: 59.7%; missed care: 54.8%). The results are very similar to what has been found in previous international studies. This suggests that working as an ICU nurse on the night shift is a high-risk job. The consequences are not only for the nurse's health, but also for the safety of the critically ill patients at the bedside.

Key Findings Summary:

- 91.1% of nurses worked night shifts; 88.7% reported difficulty falling asleep.
- 56.5% experienced occupational back injuries; 33.1% reported frequent backache.
- 47.6% reported stress; 83.9% reported mood changes; 22.6% reported anxiety.
- 69.4% experienced interpersonal workplace conflict; 75.0% reported family conflict.
- 59.7% reported nursing errors during night shifts; 54.8% reported missed care.
- Only 8.9% of nurses preferred the night shift; 65.3% preferred the morning shift.

This study has some limitations that should be mentioned. As a cross-sectional survey, causality cannot be established, and the responses to errors and health outcomes may be prone to self-reported biases. The sample was confined to one geographic region, and although multi-center, this may impact generalizability to other health care systems. Future research should include objective performance metrics, longitudinal follow-up, and larger multinational cohorts to explore causal mechanisms and intervention efficacy further.

This study highlights the integral, inseparable role of nurse well-being in patient safety. ICU administrators should do periodic audits of shift

patterns and sleep health metrics. Nurse training should also incorporate shift-work education, and sleep-health services should be accessible. Such measures can meaningfully mitigate risks at the practice level. At the policy level, lobbying for staffing guidelines to explicitly take into account night shift fatigue – much like driving-hour regulations in transport – may save lives in the long-term. To make nurse scheduling with circadian health as a priority is not only an issue of occupational welfare but also a basic aspect of clinical safety and a moral duty in modern intensive care medicine.

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